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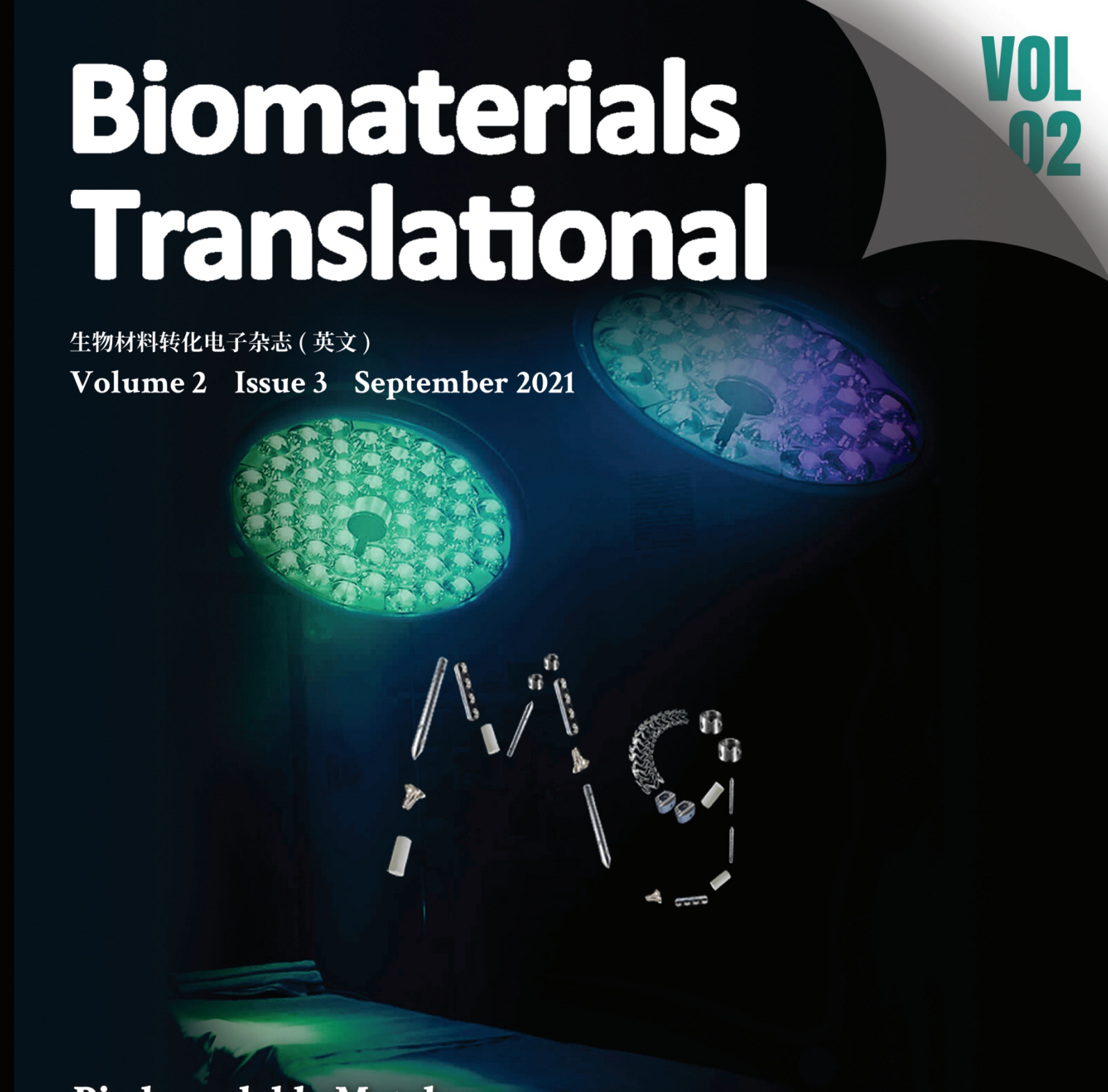

Biodegradable Metals
Materials design strategies to improve the clinical outcomes

Magnesium-Based Screws
Most promising next-generation orthopaedic devices

Magnesium-Based Materials
A revolutionary promise in the treatment of refractory bone diseases

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Biomaterials Translational is an electronic journal, which will be printed on demand of readers.

Magnesium (Mg)-based biodegradable materials have been extensively studied and many new products have been approved for clinical applications. This theme issue highlights the recent research progress of Mg-based implants and discusses the future research directions.
Cover image designed by Florence R. Wang

Biomaterials Translational is an international journal publishing research at the interface of translational medicine, biomaterials science and engineering. The journal publishes original, high-quality, peer-reviewed papers including original research articles, reviews, viewpoints and comments. Translational medicine is an interdisciplinary field that applies emerging new technologies and sciences to the prevention, diagnosis and treatment of human disease, with a particular focus on animal disease models in the application of biomaterials for treatments. Thus, the journal highlights breakthrough discoveries in basic science and clinical application of biomaterials, as well as other significant findings related to the translation of biomaterials.

The scope of the journal covers a wide range of physical, biological and chemical sciences that underpin the design of biomaterials and the clinical disciplines in which they are used.

Original articles will be considered for publication within, but not limited to, the following domains:

- Investigation of human biology and pathogenesis of diseases with potential applications of biomaterials in treatment
- Synthesis, characterization and biomedical potential of metallic, ceramic, polymeric, composite and hybrid biomaterials
- Physical, chemical, biological, pharmaceutical and toxicological features of biomaterials
- Drug and gene delivery system design, with a focus on its application to disease conditions
- Short-term and long-term biocompatibility of biomaterials
- *In vivo* disease models and the biology of the host response in application of novel biomaterials
- Biomaterials design for modern diagnosis and therapeutic clinical practice (bioimaging, biosensing, biotherapy)
- Stem cell–biomaterial-based tissue engineering

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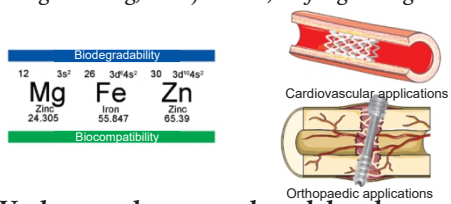
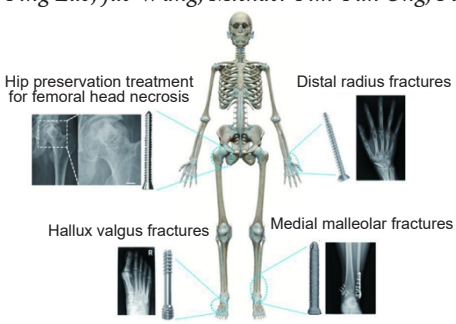
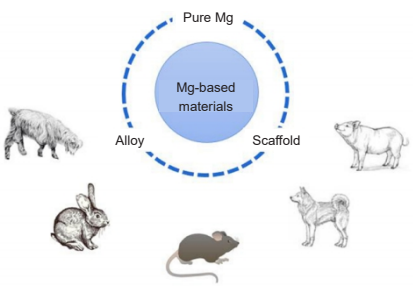


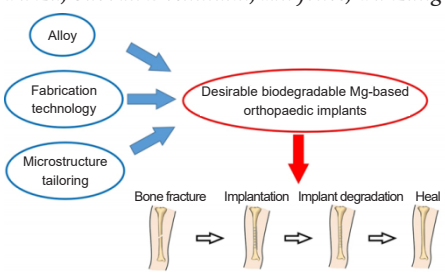
The degradable features and beneficial biological functions exhibited during degradation give biodegradable metals the potential to shift the paradigm in the treatment of orthopaedic and cardiovascular diseases.



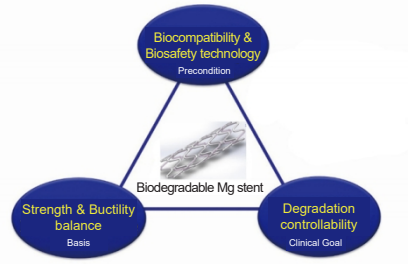
As one of the most promising next-generation orthopaedic devices, magnesium-based screws have been successfully applied around the world in increasing clinical indications to treat fractures, contributing to rapid developments in the basic and translational research of these biodegradable metal-based implants.



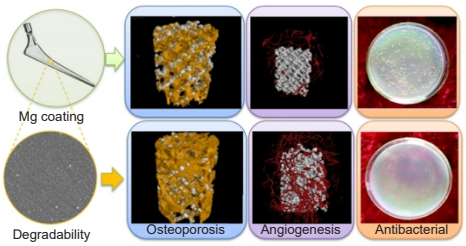
This review summarises the characteristics, advantages and disadvantages of magnesium (Mg)-based bone implants, the safety and osteogenic effects of Mg-based materials used in animal models, and provides possible guidance for the selection of animal models to test such materials in future.



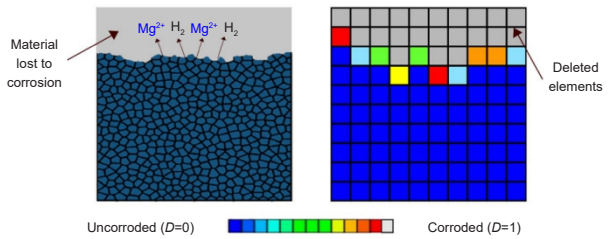
Desirable biodegradable magnesium (Mg)-based orthopaedic implants can provide superior biocompatibility, good mechanical properties and appropriate biodegradation rates over the duration of implantation, which can be tailored by different smart designs and novel fabrication strategies.



Three key aspects should be considered when designing new biodegradable magnesium (Mg)-based alloys for vascular stents application, which are biocompatibility and biosafety, mechanical properties, and biodegradation. These three aspects mentioned are correlative, affecting and restricting each other, and are named as Triune Principle in biodegradable Mg alloy design.

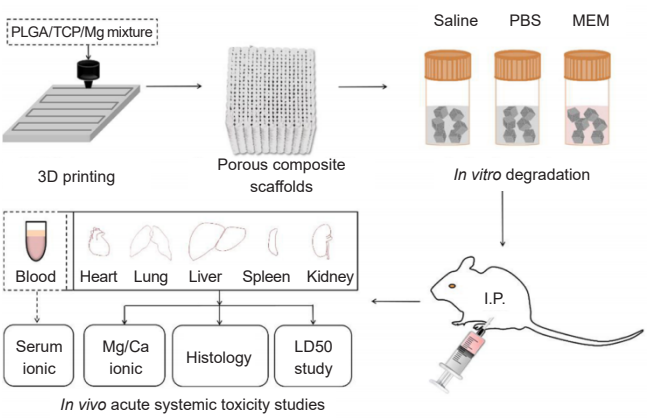


Novel biofunctional magnesium (Mg) coatings are believed to be promising candidates for surface modification of implant materials for use in bone tissue repair. *In vitro* and *in vivo* investigations have demonstrated that Mg-coated implant materials acquire biofunctions including degradability, osteogenesis, angiogenesis and antibacterial properties.



The state-of-the-art in computational modelling of the corrosion behaviour of bioresorbable magnesium (Mg)-based implants is reviewed. Computational models have the potential to bridge the observed differences between corrosion behaviour *in vitro* and *in vivo*.

RESEARCH ARTICLE



Schematic diagram showing *in vivo* acute systemic toxicity study of the three-dimensional (3D) printed magnesium incorporated porous polymer scaffolds, including scaffold fabrication, *in vitro* degradation, and *in vivo* acute systemic toxicity assessment.

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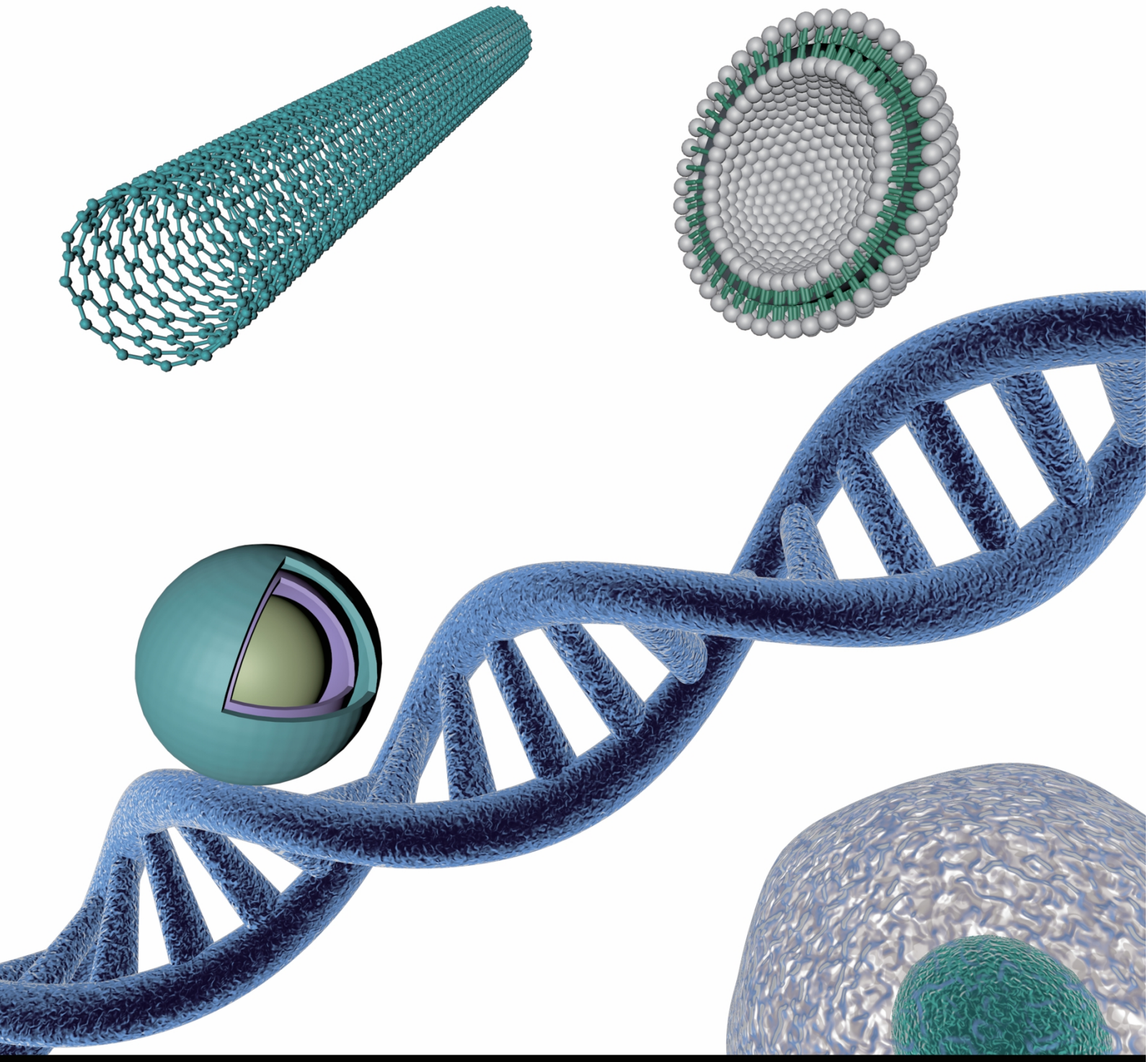

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